

WHAT IS CLAIMED IS:

1. An image processing method for determining a conversion relationship by using patches, the conversion
5 relationship relating to a generation of color material data for an image output apparatus that outputs an image by using a plurality kinds of color material, said method comprising the steps of:

providing a maximum total color material use amount
10 which is determined by taking into account an adhesion characteristic of each of the plurality kinds of color material to a printing medium used when the image output apparatus outputs the patches;

determining, for each of patches, a combination of
15 data for the plurality kinds of color material constituting the patch within a range of the maximum total color material use amount;

determining a target color on the basis of colorimetric values of the patches which are outputted based on the
20 determined combinations of data for the plurality kinds of color material for the patches; and

determining a combination of data for the plurality kinds of color material corresponding to the color target, and based on the determined combination for the color target,
25 determining the conversion relationship relating to the generation of color material data.

2. An image processing method as claimed in claim 1, wherein colors of the plurality kinds of color material are yellow, magenta, cyan and black.

5 3. An image processing method as claimed in claim 1, wherein the target color is a color having the highest saturation for each of six hues of yellow, magenta, cyan, red, green and blue.

10 4. An image processing method as claimed in claim 1, wherein the color material is ink.

5. An image processing method as claimed in claim 1, wherein the color material is toner.

15 6. An image processing method as claimed in claim 3, wherein the target colors in six hues of yellow, magenta, cyan, red, green and blue are colors changing in a L^*C^* plane from white to black through yellow, from white to black through magenta, from white to black through cyan, from white to black through red, from white to black through green, and from white to black through blue, respectively.

20 7. An image processing method as claimed in claim 6, wherein the target color is determined as a line in the L^*C^* plane which is formed by joining a target line that does not include black at all onto a target line that include

black maximally by means of a continuous function from a predetermined point on a L^* .

8. An image processing method for generating data for outputting a patch from an image output apparatus, the patch being used for correcting an output characteristic of the output apparatus that outputs an image by using a plurality kinds of color material, said method comprising the steps of:

10 providing a first patch data that is a combination of data for a plurality kinds of color material to be used for outputting the patch and is determined for each of a plurality of patches, and a maximum total color material use amount which is determined by taking into account an
15 adhesion characteristic of each of the plurality kinds of color material to a printing medium used when the image output apparatus outputs the patches;

determining a total use amount of the plurality kinds of color material for outputting the patch, based on the
20 combination of data for the plurality kinds of color material for each patch in the first patch data; and

generating second patch data by for each patch comparing the total use amount with the maximum total color material use amount and by executing a process on the first
25 patch data based on the comparison result for each patch so that the total use amount is equal to or less than the maximum total color material use amount.

9. An image processing method as claimed in claim 8,
wherein the process by which the total use amount becomes
equal to or less than the maximum total color material use
5 amount is a process that compresses the data for the plurality
kinds of color material for each patch in the first patch
data at a predetermined compression rate.

10 10. An image processing method as claimed in claim
8, wherein the predetermined compression rate is changed
in accordance with a contribution rate of each color material,
the contribution being used when the total use amount of
the plurality kinds of color material is determined.

15 11. An image processing method as claimed in claim
8, further comprising the step of generating a table for
correcting the output characteristic on the basis of
colorimetric values of patches outputted based on the second
patch data.

20 12. An image processing method as claimed in claim
11, further comprising the step of generating the data for
the plurality kinds of color material used in the image
output apparatus outputting an image, by making reference
25 to the table with input image data.

13. An image processing method as claimed in claim

11, wherein the table for correcting the output characteristic is generated within a range of colorimetric values as the table that generates data for the plurality kinds of color material for a color having the highest saturation for each of six hues.

14. An image processing method as claimed in claim 8, wherein the target color is a color having the highest saturation for each of six hues of yellow, magenta, cyan, red, green and blue.

15. An image processing method as claimed in claim 8, wherein the color material is ink.

16. An image processing method as claimed in claim 8, wherein the color material is toner.

17. An image processing apparatus for determining a conversion relationship by using patches, the conversion relationship relating to a generation of color material data for an image output apparatus that outputs an image by using a plurality kinds of color material, said apparatus comprising:

holding means for holding a maximum total color material use amount which is determined by taking into account an adhesion characteristic of each of the plurality kinds of color material to a printing medium used when the

image output apparatus outputs the patches;

patch data setting means for setting, for each of patches, a combination of data for the plurality kinds of color material constituting the patch within a range of
5 the maximum total color material use amount;

target color setting means for determining a target color on the basis of colorimetric values of the patches which are outputted based on the determined combinations of data for the plurality kinds of color material for the
10 patches; and

color separating means for determining a combination of data for the plurality kinds of color material corresponding to the color target, and based on the determined combination for the color target, determining
15 the conversion relationship relating to the generation of color material data.

18. An image processing apparatus as claimed in claim 17, wherein colors of the plurality kinds of color material
20 are yellow, magenta, cyan and black.

19. An image processing apparatus as claimed in claim 17, wherein the target color is a color having the highest saturation for each of six hues of yellow, magenta, cyan,
25 red, green and blue.

20. An image processing apparatus as claimed in claim

17, wherein the color material is ink.

21. An image processing apparatus as claimed in claim 17, wherein the color material is toner.

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22. An image processing apparatus as claimed in claim 19, wherein the target colors in six hues of yellow, magenta, cyan, red, green and blue are colors changing in a L^*C^* plane from white to black through yellow, from white to black through magenta, from white to black through cyan, from white to black through red, from white to black through green, and from white to black through blue, respectively.

23. An image processing apparatus as claimed in claim 22, wherein the target color is determined as a line in the L^*C^* plane which is formed by joining a target line that does not include black at all onto a target line that include black maximally by means of a continuous function from a predetermined point on a L^* .

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24. An image processing apparatus for generating data for outputting a patch from an image output apparatus, the patch being used for correcting an output characteristic of the output apparatus that outputs an image by using a plurality kinds of color material, said apparatus comprising:

holding means for holding a first patch data that is

a combination of data for a plurality kinds of color material to be used for outputting the patch and is determined for each of a plurality of patches, and a maximum total color material use amount which is determined by taking into
5 account an adhesion characteristic of each of the plurality kinds of color material to a printing medium used when the image output apparatus outputs the patches;

total use amount calculating means for determining a total use amount of the plurality kinds of color material
10 for outputting the patch, based on the combination of data for the plurality kinds of color material for each patch in the first patch data; and

patch data generating means for generating second patch data by for each patch comparing the total use amount
15 with the maximum total color material use amount and by executing a process on the first patch data based on the comparison result for each patch so that the total use amount is equal to or less than the maximum total color material use amount.

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25. An image processing apparatus as claimed in claim 24, wherein the process by which the total use amount becomes equal to or less than the maximum total color material use amount is a process that compresses the data for the plurality
25 kinds of color material for each patch in the first patch data at a predetermined compression rate.

26. An image processing apparatus as claimed in claim 24, wherein the predetermined compression rate is changed in accordance with a contribution rate of each color material, the contribution being used when the total use amount of the plurality kinds of color material is determined.

27. An image processing apparatus as claimed in claim 24, further comprising means for generating a table for correcting the output characteristic on the basis of colorimetric values of patches outputted based on the second patch data.

28. An image processing apparatus as claimed in claim 27, further comprising means for generating the data for the plurality kinds of color material used in the image output apparatus outputting an image, by making reference to the table with input image data.

29. An image processing apparatus as claimed in claim 27, wherein the table for correcting the output characteristic is generated within a range of colorimetric values as the table that generates data for the plurality kinds of color material for a color having the highest saturation for each of six hues.

30. An image processing apparatus as claimed in claim 24, wherein the target color is a color having the highest

saturation for each of six hues of yellow, magenta, cyan, red, green and blue.

31. An image processing apparatus as claimed in claim
5 24, wherein the color material is ink.

32. An image processing apparatus as claimed in claim
24, wherein the color material is toner.

10 33. A program read by a computer to make the computer
execute an image processing for determining a conversion
relationship by using patches, the conversion relationship
relating to a generation of color material data for an image
output apparatus that outputs an image by using a plurality
15 kinds of color material, said image processing comprising
the steps of:

providing a maximum total color material use amount
which is determined by taking into account an adhesion
characteristic of each of the plurality kinds of color
20 material to a printing medium used when the image output
apparatus outputs the patches;

determining, for each of patches, a combination of
data for the plurality kinds of color material constituting
the patch within a range of the maximum total color material
25 use amount;

determining a target color on the basis of colorimetric
values of the patches which are outputted based on the

determined combinations of data for the plurality kinds of color material for the patches; and

determining a combination of data for the plurality kinds of color material corresponding to the color target, and based on the determined combination for the color target, determining the conversion relationship relating to the generation of color material data.

34. A storage medium storing a program readably by a computer, the program making the computer execute an image processing for determining a conversion relationship by using patches, the conversion relationship relating to a generation of color material data for an image output apparatus that outputs an image by using a plurality kinds of color material, said image processing comprising the steps of:

providing a maximum total color material use amount which is determined by taking into account an adhesion characteristic of each of the plurality kinds of color material to a printing medium used when the image output apparatus outputs the patches;

determining, for each of patches, a combination of data for the plurality kinds of color material constituting the patch within a range of the maximum total color material use amount;

determining a target color on the basis of colorimetric values of the patches which are outputted based on the

determined combinations of data for the plurality kinds of color material for the patches; and

determining a combination of data for the plurality kinds of color material corresponding to the color target,
5 and based on the determined combination for the color target, determining the conversion relationship relating to the generation of color material data.

35. A program read by a computer to make the computer
10 execute an image processing for generating data for outputting a patch from an image output apparatus, the patch being used for correcting an output characteristic of the output apparatus that outputs an image by using a plurality kinds of color material, said image processing comprising
15 the steps of:

providing a first patch data that is a combination of data for a plurality kinds of color material to be used for outputting the patch and is determined for each of a plurality of patches, and a maximum total color material
20 use amount which is determined by taking into account an adhesion characteristic of each of the plurality kinds of color material to a printing medium used when the image output apparatus outputs the patches;

determining a total use amount of the plurality kinds
25 of color material for outputting the patch, based on the combination of data for the plurality kinds of color material for each patch in the first patch data; and

generating second patch data by for each patch
comparing the total use amount with the maximum total color
material use amount and by executing a process on the first
patch data based on the comparison result for each patch
5 so that the total use amount is equal to or less than the
maximum total color material use amount.

36. A storage medium storing a program readably by
a computer, the program making the computer execute an image
10 processing for generating data for outputting a patch from
an image output apparatus, the patch being used for
correcting an output characteristic of the output apparatus
that outputs an image by using a plurality kinds of color
material, said image processing comprising the steps of:

15 providing a first patch data that is a combination
of data for a plurality kinds of color material to be used
for outputting the patch and is determined for each of a
plurality of patches, and a maximum total color material
use amount which is determined by taking into account an
20 adhesion characteristic of each of the plurality kinds of
color material to a printing medium used when the image
output apparatus outputs the patches;

determining a total use amount of the plurality kinds
of color material for outputting the patch, based on the
25 combination of data for the plurality kinds of color material
for each patch in the first patch data; and

generating second patch data by for each patch

comparing the total use amount with the maximum total color material use amount and by executing a process on the first patch data based on the comparison result for each patch so that the total use amount is equal to or less than the
5 maximum total color material use amount.